501/616

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 August 2003 (07.08.2003)

PCT

(10) International Publication Number
WO 03/065023 A1

(51) International Patent Classification[7]: G01N 23/04, G01V 5/00, G01N 23/10

(21) International Application Number: PCT/GB02/00353

(22) International Filing Date: 28 January 2002 (28.01.2002)

(25) Filing Language: English

(26) Publication Language: English

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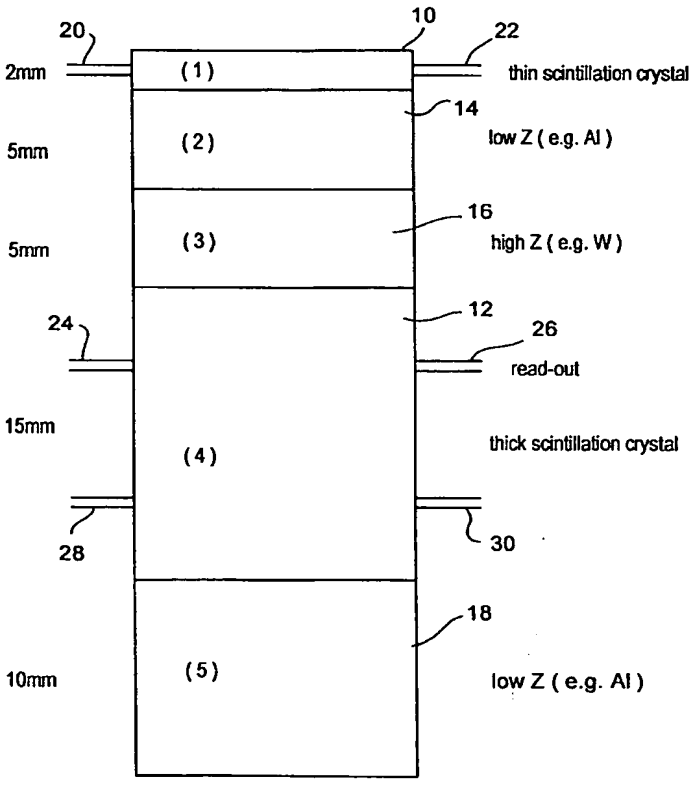
(81) Designated State *(national)*: US.

(84) Designated States *(regional)*: European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: X-RAY INSPECTION SYSTEM AND METHOD



(57) Abstract: An X-ray inspection system in which a thin X-ray absorber is placed upstream of an object under investigation so as to remove low energy X-rays, typically below 0.5MeV. The absorber may be a sheet of lead 10mm thick. Where the X-ray inspection system which incorporates a detector which relies on the electro-magnetic cascade effect produced in suitable materials when bombarded with X-rays so that energy is transferred into the material at different depths depending on the energy of incident X-rays, and the first component on which the X-rays impinge comprises a relatively thin crystal this unwanted background may be reduced by placing a vessel containing a fluid whose density is less than that of air, in front of the detector crystal array. Typically the fluid is helium at atmospheric or slightly greater than atmospheric pressure. The background can be reduced by applying a magnetic field in the region in front of the detector crystal array so as to sweep away electrons from that region.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01N23/04 G01V5/00 G01N23/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01N G01V

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	WO 93 14419 A (CAMBRIDGE IMAGING LTD) 22 July 1993 (1993-07-22) page 6, paragraph 3 -page 7, paragraph 1; figures ---	1-4,10, 41,42 8
Y	US 5 960 057 A (MAJEWSKI LUCASZ A ET AL) 28 September 1999 (1999-09-28) column 2, line 52 - line 65; figure 1 column 3, line 59 - line 65 column 4, line 53 - line 57 --- -/--	1-3,10, 41,42

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 November 2002	16.01.03

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Savage, J

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	MAEDA K ET AL: "Development of an in-air high-resolution PIXE system" NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH, SECTION - B: BEAM INTERACTIONS WITH MATERIALS AND ATOMS, NORTH-HOLLAND PUBLISHING COMPANY. AMSTERDAM, NL, vol. 134, no. 3-4, 1 March 1998 (1998-03-01), pages 418-426, XP004122869 ISSN: 0168-583X abstract page 420, left-hand column, line 4 - line 10; figure 1 ---	1-4,10
Y	DATABASE WPI Derwent Publications Ltd., London, GB; AN 1984-016591 XP002220277 & SU 1 004 834 A (CRYSTALLOGRAPHY INS), 15 March 1983 (1983-03-15) abstract ---	1-3,10
Y	GB 2 295 454 A (HITACHI LTD ;HITACHI INSTRUMENTS ENG (JP)) 29 May 1996 (1996-05-29)	10
A	abstract page 5, line 25 -page 6, line 2 page 7, line 5 - line 10 ---	8
A	KALININ B N ET AL: "Investigation of positron generation by relativistic electrons in aligned crystals" NUCLEAR INSTRUMENTS & METHODS IN PHYSICS RESEARCH, SECTION - B: BEAM INTERACTIONS WITH MATERIALS AND ATOMS, NORTH-HOLLAND PUBLISHING COMPANY. AMSTERDAM, NL, vol. 145, no. 1-2, 2 October 1998 (1998-10-02), pages 209-220, XP004150616 ISSN: 0168-583X page 212, right-hand column, line 10 - line 14 -----	1

INTERNATIONAL SEARCH REPORT

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Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-4,8,10,41,42

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-4,8,10,41,42

   A vessel containing a fluid whose density is less than that of air placed in front of a detector.

2. Claims: 5-7

   A thin x-ray absorber

3. Claims: 9,10

   Generation of a magnetic field

4. Claims: 11,12

   A collimator in front of a detector

5. Claims: 13-23

   Material discrimination system comprising low-Z and high-Z converters

6. Claims: 24-29

   Using photodiodes to "read-out" crystal

7. Claims: 30,31

   Type of scintillation crystals

8. Claims: 32-34

   A detector including a linear Accelerator

9. Claims: 35-40

   Method of calibrating a linear accelerator

10. Claim : 43

    Method for testing for the presence of materials

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